

APPENDIX PSEUDOCODE FOR SEQUENCING RUNTIME

(Turns on lowest runtime)
(Turns off high runtime)

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if (Lead Lag Config.= Efficiency Optimized With Runtime)

- mark invalid runtimes or
 - disabled boilers or
 - invalid combos
- } comment

```
repeat for Boiler index 1 to MAXSTAGES (typical MAXSTAGE = 16)
  if (Stage [index].Heat Stage Runtime = INVALID) (e.g. 65535)
    [set stage [index]. AddRank = 0]
    [set stage [index]. DelRank = 0]
  endif
endrepeat
```

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```
repeat for Boiler index 1 to MAXSTAGES
  if (Stage [index].Heat Stage Runtime != INVALID) (e.g. not 65535)
    and Stage [index]. AddRank = 0
    and Stage [index]. DelRank = 0)
    [set stage [index]. AddRank = 15]
    [set stage [index]. DelRank = 0]
  elseif (Stage [index]. AddRank != 0
    and Stage [index]. DelRank != 0)
    [set stage [index]. AddRank = 15]
    [set stage [index]. DelRank = 0]
  else
    [do nothing]
  endif
endrepeat
```

y = 0 ! stage y has the lowest runtime hours

Lowest Runtime = 65535

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Boiler On Tot = 0

v = 0

! stage v has the high runtime hours

Highest Runtime = 0

Comment:

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calculate add ranks of runtimes

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PSEUDOCODE FOR SEQUENCING RUNTIME

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```

→ calculate ADD ranks of Runtime
repeat for Boiler index 1 to MAXSTAGES
    [ if (Stage [index].Heat Stage Runtime != INVALID)
      and Stage [index]. AddRank != 0 } current stage is off
      and Stage [index]. DelRank = 0 )
      and Stage [index]. Heat Stage Runtime ≤ lowest Runtime
      [ Lowest Runtime = Stage[index]. HeatStageRuntime
        v = [index]
      endif
    ]

→ calculate DEL ranks
    [ if (Stager [index]. AddRank = 0
      and (Stager [index]. DelRank != 0) } current stage is on
      [ if (NumberofStages Requested = 0)
        [ set Stage [index]. AddRank = 15
          set Stage [index]. DelRank = 0 setTotalOnStages ++
        else if (Stage [index]. Heat Stage Runtime ≥ Highest Runtime
          [ Highest Runtime = Stage [index]. Heat Stage Runtime
            v = [index]
          endif
        ]
      ]
    ]
  endif
endrepeat

```

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```

if (number of Stages Requested  $\geq$  Total On Stages)
    ! requested stages are greater than what is currently on So add stages!
    ! stage y has the lowest runtime total so add it first
    [set stage [index]. AddRank = 0]          set stage on!
    [set stage [index]. DelRank = 0]
else if (number of Stages Requested < BlrOnTol)
    ! requested stages are less than what is currently on so del stages
    ! stage v has the highest runtime total
    [set stage [index]. AddRank = 15]
    [set stage [index]. DelRank = 0]          set stage off!
else
    no change
end if

```